March 1974

U S D A FOREST SERVICE
RESEARCH NOTE RM-256

FOREST SERVICE
U.S. DEPARTMENT OF AGRICULTURE

ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

A Sleeved Pit Gage for Summer Precipitation

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Performance of a pit gage was greatly improved by using a 5-gallon cream can as a sleeve. Four years of experience have shown the improved pit gage to be nearly ideal for keeping the gage vertical and free of soil, and facilitating quick removal and reinsertion of the gages for periodic weighing.
Oxford: 111.77. Keywords: Rain gages.

Measurement of summer precipitation in treeless, windswept areas has long been a severe problem. Raindrops transported beyond their free-fall trajectory by wind often introduce large and unacceptable errors in measurement. Solutions to this problem have centered on (1) protecting the gage against wind, or (2) sinking the gage into the ground to remove it from the wind's influence as much as possible.[2] This last approach has become known as the standard sunken or pit gage.

Most pit gage installations suffer from a basic defect: inadequate control of the pit. Typically, the initial hole is made only slightly larger than the gage itself. Over time, however, sluffing of the pit sides introduces several problems. First, keeping the gage vertical within the widening hole becomes increasingly difficult. Second, the gage must be cleaned of soil material slumping against its sides at every service date, particularly where data are based on weight of the can and its contents. Third, the widening hole renders splash shields less effective and finally unusable. These problems together steadily reduce the pit gage's effectiveness against wind, make the data less reliable, and finally lead to abandonment of the site.

An improved pit gage to overcome these problems was developed at our research site on the windswept plains of south-central Wyoming.

Pit Gage Design

One obvious solution to the problems described is to equip the pit gage with a ground sleeve. A properly installed sleeve would keep the gage vertical at all times, shield it from soil material, facilitate the use of splash shields, and allow ready removal and reinsertion of the gage at every service date. Although various kinds of metal, masonry, or plastic sleeves could be used, we have found that a 5-gallon cream can from a local dairy makes a near-perfect sleeve. Its inside diameter of 8½ inches and its length of about 20 inches make it nearly ideal for the standard 8-inch-orifice rain gage. In addition, its stainless steel construction renders it virtually immune to soil corrosion.

The pit gage should be installed on a level, open site, free of any shadowing by shrubs or other objects within an angle of 45° from the vertical gage centerline. After a hole large

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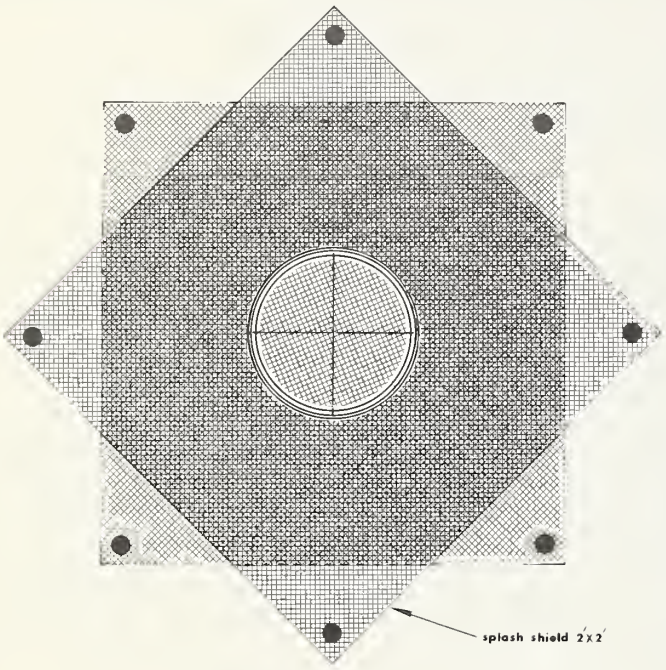
[2] *Kurtyka, J. C. 1953. Precipitation measurements study. Ill. Water Surv. Invest. 20, 178 p.*

enough to accept the cream can has been excavated, a bed of gravel 2 to 4 inches thick is installed to promote drainage away from the gage. The cream can, with a hole cut in its bottom, is placed on the gravel and carefully backfilled in a vertical position so that it protrudes above the soil surface about ½ to 1 inch (fig. 1). Additional gravel is placed within the sleeve to bring the gage orifice about ½ to 1 inch above the sleeve lip, a height sufficient to keep most surface debris out of the gage.

A splash shield, formed of two 2- by 2-foot squares of bulk furnace filter or other suitable material, is secured to the ground surface around the gage orifice in an offset diamond pattern (fig. 1). This dimension has been adequate for our use, keeping the majority of large raindrops and most hailstones from splashing or bouncing into the gage. The pit gage is completed by installation of a rodent screen of ¼-inch hardware cloth, suspended 8 to 10 inches below the orifice from wires either hooked over the gage lip or punched into the gage sides. The rodent screen has effectively kept these small animals out of the gage contents, thereby eliminating a problem affecting precision.

The sleeved pit gage can be installed and put into service quickly, in most instances under an hour. Cost of materials will depend on prices paid for the cream can or other sleeve material. We were able to find old cans for 50¢ each; total costs did not exceed $7, excluding fencing against livestock where necessary.



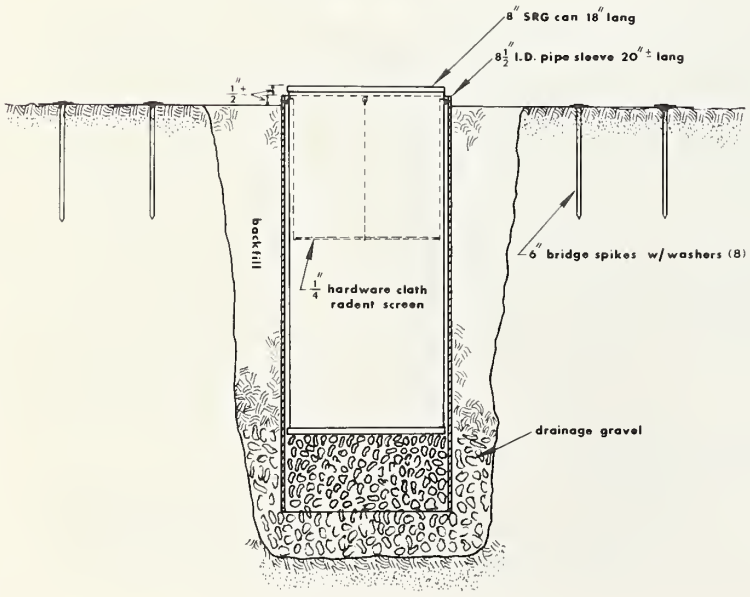


Figure 1.—Cutaway diagram of a sleeved pit gage installation.

Applications

A network of 20 sleeved pit gages has functioned perfectly over a 4-year period (fig. 2). The gages remained vertical and free of soil material, and were quickly removed and reinserted during periodic weighing. Because data collection is rapid and easy (fig. 3), more intensive sampling networks can be maintained at the same operating costs.

Figure 2.—A functioning sleeved pit gage in a typical windswept situatian.

Figure 3.—The gage can be easily lifted aut af its sleeve far servicing.

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